The mean temperature of the year 1894 was 49°·9, being 0°·5 above the average for the fifty years 1841-1890. The severe frost which set in on December 30, and continued with slight intermission until March 9, was the most remarkable meteorological feature of the year. The cold wave, defined as the period during which the mean daily temperature was below the average, extended from 1894 December 30 to 1895 March 9, with a break from January 14 to 20, and on March 1, a period extending over seventy days in all. The total defect of mean daily temperature below the fifty years' average during this period was 489°, or 7°·0 per day.

A comparison with some of the coldest winters since 1841 is given in the following table:—

Period of cold wave.	Number of days.	Total defect of mean daily temperature.
1845 Jan. 27—March 21 . .	54	443°
1855 Jan. 10—Feb. 24 . .	46	467°
1870 Dec. 21—1871 Feb. 3 . .	45	320°
1886 Jan. 5—March 18 . .	73	408°
1890 Nov. 25—1891 Jan. 22 . .	59	560°
1894 Dec. 30—1895 March 9 . .	70	489°

The cold on the four days February 6, 7, 8 and 9 was particularly severe, the mean temperature being 18°·6 or 20°·5 below the average of the 50 years from 1841-1890, and there is no other instance of four consecutive days since 1841 with so low a temperature.

The lowest temperature recorded during the winter was 6°·9 on February 8, the lowest temperature in February since 1841, the next lowest being 7°·7 on 1845 February 12. Lower temperatures have been registered twice since 1841, viz. 4° on 1841 January 9 and 6°·6 on 1867 January 5. The mean temperature throughout the whole of February was 28°·9, or 10°·5 below the 50 years' average. The mean in February 1855 was 29°·2.

The mean daily horizontal movement of the air in the twelve months ending 1895 April 30 was 283 miles, which is slightly above the average. The greatest movement was 867 miles on December 22, and the least 50 miles on August 30. The greatest pressure of the wind was 36 lbs. on the square foot on March 24, with a velocity of 56 miles in the hour. During the gale of December 22, the greatest pressure recorded was 30 lbs., with a velocity of 50 miles in each of two hours.

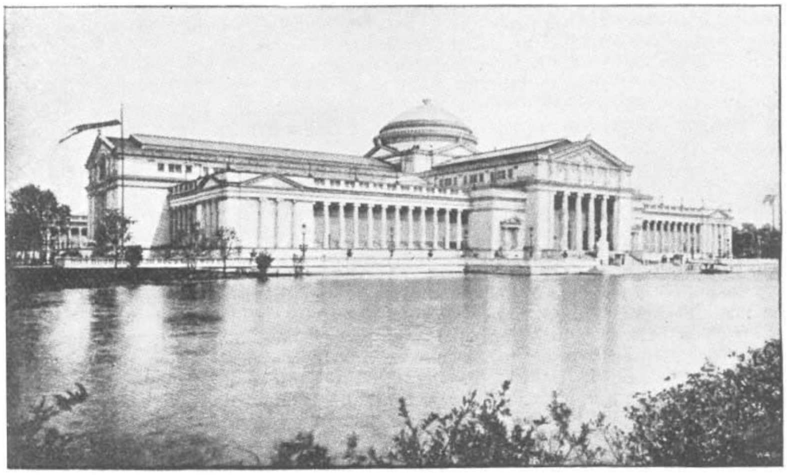
The number of hours of bright sunshine recorded during the twelve months ending 1895 April 30 by the Campbell-Stokes instrument was 928 out of the 4454 hours during which the sun was above the horizon, so that the mean proportion of sunshine for the year was 0·208, constant sunshine being represented by 1. In the corresponding period for 1893-4, the number of hours of sunshine was 1364, and the mean proportion of sunshine was 0·306.

The rainfall in the year ending 1895 April 30 was 24·56 inches, which is very nearly the same as the average amount for the 50 years 1841-1890. The number of days on which rain fell was 187.

THE FIELD COLUMBIAN MUSEUM.

THE museum founded to commemorate the World's Columbian Exposition at Chicago has reached a stage which enables it to commence a series of publications designed to present to the world the results of research conducted under its auspices. The first of this series is before us, and is devoted to an historical account of the movement that resulted in the establishment of the museum. From this description we extract the following sketch of the early history of the museum, and of the general character of the contents.

The formation of a museum at Chicago, after the Columbian Exposition, was suggested by Prof. Putnam in 1890, and received the support of Prof. Goode, Director of the U.S. National Museum, Prof. Wilson, of the Smithsonian Institution, and other representative men. In the summer of 1893, a number of the prominent citizens of Chicago resolved "to establish in Chicago a great museum that shall be a fitting memorial of the World's Columbian Exposition, and a permanent advantage and honour to the city." The delicate and important task of securing the funds necessary to carry the resolution into effect was at once begun, but the appeal at first met with little response. A munificent gift from Mr. Field gave confidence in the assured prominence and success of the museum. Mr. G. M. Pullman followed with a subscription of 100,000 dollars, and a like sum was contributed by Mr. H. N. Higinbotham. Mrs. M. D. Sturgis gave 50,000 dollars, and a number of other donations for various amounts were made, as well as Exposition stock having the approximate par value of 1,500,000 dollars. With these funds in hand, the museum committee felt justified in making extensive purchases, including the exhibits from Paraguay, Peru, Java, Samoa, the Hagenbeck collection, and the Ward collection of natural history, for which a sum of 95,000 dollars was paid. The new President of the museum, Mr. E. E. Ayer, presented the Ayer anthropological collection, valued at 100,000 dollars, to the museum, and other donations of material followed. Many exhibits were purchased at the close of the Exposition, and these furnished the broad foundation upon which the present collections have been built. Great gaps in the continuity of separate subjects have thus been, to a large degree, obviated, until to-day, from one end of the museum to the other, can be traced the story of nature and of man and his works.



The Field Columbian Museum.

The collections illustrating geology in the museum are grouped into Systematic Geology and Economic Geology. In the former division there are about five thousand palæontological specimens, many of them especially instructive and valuable, and as many specimens of minerals, classified according to the chemical constitution of each species. The collection of meteorites in the same division includes several very large specimens, notably the meteoric stone from Phillips County, Kansas, weighing 1184 lbs.; two masses weighing respectively 465 and 344 lbs., with several smaller ones from the meteorite of the Kiowa County, Kansas; two masses weighing 1013 and 265 lbs. respectively, and several smaller ones of the Cañon Diablo, Arizona, meteorite; about 650 individual aerolites of the Winnebago County, Iowa, fall, and many other specimens. Physical geography, structural and dynamical geology, and lithology are also well represented in the division of systematic geology.

The collections of the division of Economic Geology were obtained through the Chief of the Department of Mines, Mining and Metallurgy of the World's Columbian Exposition, from exhibits made in that exposition. Being designed to illustrate the practical bearings of the science of geology, they consist chiefly of specimens which show modes of occurrence in nature of minerals having economic importance, and the localities where they may be obtained. In addition to these, however, are

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many illustrations of the processes employed in the extraction and treatment of minerals or ores, and of the application of resulting products to human arts and industries.

An immense amount of material, illustrative of the botany and forestry of all parts of the world, came into the possession of the museum at the close of the Exposition. These exhibits are gradually being arranged in geographical sequence, but some time must elapse before all the specimens can be fully identified and labelled.

The Department of Zoology includes all the classes of animals except birds, and six large halls of the museum building are set apart for the specimens belonging to it. The mounted collection of birds in the Department of Ornithology is essentially one of comparative ornithology, in which the bird fauna of the world is represented by some 650 species. North American bird-life is at present only represented by some 150 species out of a possible 825. Among the treasures of which the museum can boast, however, is a pair of the now (probably) extinct Labrador Duck (*Camptolaimus Labradorius*).

The extensive exhibits illustrating the archæology and ethnology of America, brought together by Prof. F. W. Putnam, were transferred to the museum at the close of the Exposition. A number of other very important collections, representing primitive culture in many widely separated regions of the world, were also obtained. Belonging to the Department of Anthropology are psychological and physical laboratories, and collections of cranic casts, &c., illustrating the physical characteristics of man.

During the Exposition a great group of exhibits had been brought together within the Department of Transportation, to illustrate the evolution of the carrying industry, beginning with its inception in remote times, and extending down to the present day. These exhibits were transferred to the museum building, and largely augmented by collections from other departments. All of this material, together with a number of exhibits illustrating other industries of especial importance to civilised man, including ceramics, the textile art, the leather industry, jewellery, &c., have been brought together in a Department of Industries. The collections in this department have been arranged to show, as far as possible, the more important steps which have led to improvement in handiwork, or progress in the invention of those implements, machines, and processes which have proved to be important factors in the world's material development.

Although but a few months have elapsed since the doors of the museum were publicly thrown open, a course of popular lectures have been inaugurated, a publication series established, and several scientific expeditions sent into the field for augmenting its collections. In these and other directions, the Field Columbian Museum appears to be advancing along the path marked out for it, and performing its part in adding to the wealth of Western civilisation and culture.

PRIZE SUBJECTS OF THE FRENCH SOCIÉTÉ D'ENCOURAGEMENT.

THE prizes and prize subjects of the French Société d'Encouragement pour l'industrie nationale, for 1896 and 1897, are described in the *Bulletin* of the Society. The Society's Grand Prize of 12,000 francs will be given this year to the author of the discovery most useful to French industry. The following list shows the arrangements with regard to the prizes of the two succeeding years:—

1896.

Grand medal to the author, of any nationality, of works that have exercised the greatest influence on the progress of French mechanical arts during the preceding six years.

The Henri Giffard prize of 6000 francs for signal services to French industry. The Parmentier prize of 1000 francs for researches tending to improve the material or processes of agriculture and alimentary industries. The Meslens prize of 500 francs for the author of an application of physics or chemistry to electricity, ballistics, or hygiene.

In the section of Mechanical Arts, a prize of 3000 francs is offered for the best motor fed with some commercial oil. Other prizes are:—3000 francs for an engine of from 25 to 100 horse-power, using as a maximum, when working, 7½ kilogrammes of steam per hour and per indicated horse-power; 2000 francs to the manufacturer who first produces, mechanically, linen threads of which at least 100,000 metres go to one kilogramme, or, in the case of hemp, 15,000 metres per kilogramme; 2000 francs for an investigation, or a method tending to prevent, or at least reduce in amount, the leakages, known as "fuites aux tubes," in marine boilers; 1000 francs for the best memoir on the cost price of the motive power of steam; 2000 francs for a small motor suitable for a home workshop, and which will work by the use of some simple power available in the house, or by energy transmitted from a central station; 3000 francs for improvements in the processes of retting linen and hemp in industrial use.

The prizes offered in the section of Chemical Arts are: 1000 francs for the utilisation of waste products; 2000 francs for a work or memoir of use to chemical or metallurgical industry; 2000 francs for an experimental study of the physical or mechanical properties of one or more metals or alloys, selected from those which are in current use; 2000 francs for a new process for the production of fuming sulphuric acid, or sulphuric anhydride; 2000 francs for an improvement in the manufacture of chlorine; 1000 francs for the discovery of a new alloy useful to the arts; 2000 francs for a scientific study of combustion in the furnaces used for the production of gas; 2000 francs for an investigation of the expansion, elasticity, and tenacity of ceramic clays and coverings; 1000 francs for the substitution of sulphuric acid in dyeing, and especially in silk dyeing, by another compound which will give to the fibres the desired stiffness, without exercising any destructive action; 2000 francs for an investigation of the physical and mechanical properties of glass; 2000 francs for the discovery of processes capable of yielding, by certain chemical changes, useful organic products, such as quinine, cane-sugar, &c.; 2000 francs for an investigation on an industrial process of which the theory is but imperfectly known; 2000 francs for the production of cast steel or iron having useful properties, by the incorporation of a foreign substance.

In Economic Arts the following are the prizes and subjects. A prize of 2000 francs for the invention of a new process in which at least 0·800 kilogrammes of petroleum can be used without danger, as a source of light or heat, either in industry or in domestic economy; 2000 francs for the discovery of methods to diminish the number of chimney fires, and reduce the damage which results from them; 2000 francs for an incandescent electric lamp of one-tenth candle power when a current of 0·05 ampere is passing through it at a potential of 100 volts.

In Agriculture the prizes and subjects are as follows:—2000 francs for the best investigation of the comparative physical and chemical constitution of the soils of one of the natural or agricultural regions of France; 1500 francs for the best varieties of barley for brewing; 3000 francs for the re-establishment of vineyards on chalk soils; 1500 francs for the introduction and culture, on a large scale, of a new forage plant; 2000 francs for the best study of the culture of the vine in various regions o France, and of the influence of various processes of vinification on the quality of wine.

A prize of 1000 francs is offered for the discovery of a plastic material, similar in appearance to some stone, marble, or brick, and hard enough to be used either for the insides or the outsides of houses; 1000 francs for the discovery of a process to prevent woods used by carpenters and cabinet-makers from deformations by atmospheric influences; 1000 francs for the author of the best memoir on some practical process other than a chemical process, and capable of being applied in the workshop, for the detection of adulterated Portland cement.

1897.

A prize of 2000 francs is offered for improvements in the methods of grinding grain; and a prize of 2000 francs for a motor weighing less than fifty kilogrammes per horse-power. This prize is offered with the idea of furthering the problem of aerial navigation. A second prize, having the same object, is for a study of the coefficients necessary to the mechanical calculation of an aerial machine. There is also a prize of 3000 francs for improvements in the manufacture of permanent magnets; and prizes of 3000 francs for an investigation of alcoholic ferments, and 2000 francs for the best investigation of the deterioration of cider, and the means to prevent the changes to which the loss of vivacity is due.

The prizes are open to investigators of any nationality, but the memoirs, and descriptions of inventions, should be written in French. Models, memoirs, descriptions, and specimens intended to compete for prizes must be sent to the Secrétariat de la Société d'Encouragement pour l'industrie nationale, 44 rue de Rennes, Paris. Competitors for the prizes of 1896 must send in before the end of the present year; the latest time for entering memoirs, &c., for the 1897 competition is the end of 1896.

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